# licitation of natural disease resistance and enhancing the postharvest quality of *Capsicum annuum* L. through selected pre-harvest agricultural practices

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# ABSTRACT

**Elicitation of natural disease resistance and enhancing the postharvest quality of *Capsicum annuum* L. through selected pre-harvest agricultural practices**

A series of studies was undertaken to enhance natural disease resistance of *Capsicum annuum* L. cvs. HYW and CA-8, against anthracnose and postharvest quality, through some selected pre- and postharvest treatments and varying irrigation regimes. *C. acutatum* was shown to be associated with chili anthracnose for the first time in Sri Lanka. The chemical elicitor, potassium silicate (Kasil®) was applied as postharvest treatment at a series of concentrations, 0 (control), 100, 200, 400 and 1000 mg/l and found that the concentration at 200 mg/l was effective. Elicitor treatment, at 200 mg/l, was done once in a week for 4 weeks, as pre-harvest soil drench to field grown plants, commencing from flowering. It resulted in significantly reduced anthracnose disease when the harvested fruits were challenge-inoculated with *C. acutatum*. Postharvest application of potassium silicate (Kasil®), at the same concentration reduced anthracnose lesion area by 25 - 100%, compared to the untreated controls. Postharvest spray treatment of chili at mature, green stage with potassium silicate at 200mg/I, reduced the severity of anthracnose development by 34-100%. Spore germination assay revealed that potassium silicate has no antifungal effect on conidia of *C. acutatum*. Potassium silicate (Kasil®) treated fruits, inoculated with *C. acutatum* after harvest, showed greater accumulation of phytoalexins and enhanced β-1, 3-glucanase activity in the tissues. Phytoalexins and Pathogenesis-Related (PR) Proteins such as β-1, 3-glucanase are considered to play an important role in plant disease resistance.

Deficit irrigation was carried out, where the sweet pepper (*Capsicum annuum* L.) plants cvs. Pepperone, Marconi Rosso and Friggitello were treated with 100, 200 mL $day^{-1}$ (lowest and medium irrigations, respectively) and with 400 mL $day^{-1}$, as control, from the day of anthesis to harvesting maturity. The results revealed that water stress reduced fresh

and dry weights but increased fruit dry matter. Water stress had little effect on the incidence of blossom-end rot (BER). Water stressed plants in fact had a slightly higher incidence of BER than control plants. The concentration of sugars and total phenolics that are linked to taste and/or 'healthfulness' respectively, increased with the less water treatment. Meanwhile, postharvest quality of *C. annuum* L. was enhanced by the influence of soil moisture status, the deficit irrigation.

In conclusion application of chemical elicitor, the Potassium silicate (Kasil®), either as a pre-harvest drench or a postharvest spray treatment reduced anthracnose disease in ripe chili showing that Potassium silicate (Kasil®) offers a great promise as an alternative control strategy to synthetic pesticides for anthracnose in *C. annuum*. Deficit irrigation improved postharvest quality of *C. annuum*.

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